

Contact List

Kitt Peak Visitor Center—318-8726
Nick Petrosino, Supervisor
npetrosino@noao.edu
318-8732

NOAO Public Outreach
Rich Fedele, Manager
rfedele@noao.edu
318-8163
Robert Wilson,
Sr. Program Coordinator
rwilson@noao.edu
318-8440

Kitt Peak Docent Program

950 N Cherry Ave
Tucson, AZ 85719

Docent Forum: <http://groups.yahoo.com/group/docentforum/>

Docent Calendar: <http://groups.yahoo.com/group/docentforum/>

Volunteering at Kitt

Peak: <http://www.noao.edu/outreach/kpoutreach.html>

www.noao.edu



Next Docent Meeting Monday, November 20

The next docent meeting will be held on Monday, November 20. The meeting will convene at 6:00 in the main conference room and will feature dinner and a speaker. Docents should visit the docent forum calendar to schedule their hours. Docents who do not have web access may contact Nick Petrosino. See the URL for the docent calendar at lower left.

«First Name» «Last Name»
«Mailing Address»
«City» «State» «Zip Code»



DOCENT NEWS

THE TRANSIT OF MERCURY, A SPECIAL EVENT AT KITT PEAK

Points of Interest:

- The docent meeting is scheduled for Monday, November 20 and features dinner and a speaker.
- November 3: Taurids Meteor Shower peak
- November 3: Griffith Observatory reopens
- November 8: Mercury transits the Sun, event scheduled at Kitt Peak including Exploratorium webcast of transit
- November 18: Leonids Meteor Shower peak, Meteor Madness at Kitt Peak
- November 21: Asteroid 2001 WV1 near-Earth flyby at 0.038 AU
- November 25: Mercury at greatest western elongation of 20 degrees
- November 28: Moon occults Uranus

For additional information about these points of interest, visit <http://www2.jpl.nasa.gov/calendar/>.

People usually think of the solar system as comprising a few bright objects in the day or nighttime sky. Beyond that the workings of the solar system remain conceptual.

On Wednesday, November 8, though, people will be able to witness part of the solar system in action. Beginning at 12:12 p.m. Mercury will pass across the disk of the Sun, an event called a transit. For Mercury transits happened only about thirteen times a century. During the transit viewers will see a planet moving in its orbit for five hours as Mercury passes in front of the Sun.

To allow as many people as possible to view this event, the Exploratorium will have staff on Kitt Peak to video the event and the video will be uploaded to the internet as a webcast. The webcast will be available at <http://www.exploratorium.edu/transit/index.html>

During the video of the transit, pre-

recorded interviews with scientists will help people understand the scientific value of this special event. Interviewees from Kitt Peak will include scientist Andrew Potter of the National Solar Observatory who will observe the tenuous atmosphere of Mercury as it is silhouetted against the solar background.

The visitor center will have activities from the Family Astro kit Race to The Planets available to the public beginning at noon. The Coronado telescopes and the Meade 16-inch will be available also for public viewing. The admission fee for the event will be \$5.00 for adults and \$2.00 for children six to twelve. Children under six years old are free.

Telescope operators are needed for the Coronado and Meade telescopes. Please reply to the docent coordinator if you would like to assist with this event.

MORE METEOR MADNESS IN NOVEMBER

Last month's Orionids meteor shower put on a respectable show for eight guests in the Meteor Madness program. The small group passed the wee hours of the morning on Saturday, October 22 from 1:00 to 4:00 huddled in the ROR observatory with the constellation of Orion in full view and the 16-in RC available for their viewing pleasure.

The Orionids are usually numerous but faint, averaging about twenty per hour or one every three minutes. The group witnessed plenty of faint meteors, seen easily against the dark Kitt Peak sky, but also watched some very bright sporadic meteors blaze across the heavens to everyone's delight.

November is the month of the Leonids and another chance for the public to enjoy meteor madness. November 17th is the typical date

on which the Leonids peak, but this year the shower will spike on the morning of the 19th as the Earth encounters the tail of a comet debris field. Unfortunately the intensity of the predicted outburst is uncertain and will occur at a time when the radiant is well below the horizon for observers at this location.

Nonetheless, guests are expected to arrive at 12:30 a.m. on Saturday, November 18 and park in the picnic area. They will be shuttled to the visitor center for the program, which lasts from 1:00 to 4:00 a.m. The price is \$25.00 for regular admission and \$23.00 for seniors, students, military, and children. Interested parties may contact the visitor center to make reservation. Docent assistance may be required depending on the size of the group.

MARS MAY BE COZY PLACE FOR HARDY MICROBES

A class of especially hardy microbes that live in some of the harshest Earthly environments could flourish on cold Mars and other chilly planets, according to a research team of astronomers and microbiologists.

In a two-year laboratory study, the researchers discovered that some cold-adapted microorganisms not only survived but reproduced at 30 degrees Fahrenheit, just below the freezing point of water. The microbes also developed a defense mechanism that protected them from cold temperatures. The researchers are members of a unique collaboration of astronomers from the Space Telescope Science Institute and microbiologists from the University of Maryland Biotechnology Institutes Center of Marine Biotechnology in Baltimore, Md. Their results appear on the International Journal of Astrobiology website.

The low temperature limit for life is particularly important since, in both the solar system and the Milky Way Galaxy, cold environments are much more common than hot environments, said Neill Reid, an astronomer at the Space Telescope Science Institute and leader of the research team. Our results show that the lowest temperatures at which these organisms can thrive fall within the temperature range experienced on present-day Mars, and could permit survival and growth, particularly beneath Mars surface. This could expand the realm of the habitable zone, the area in which life could exist, to colder Mars-like planets.

Most stars in our galaxy are cooler than our Sun. The zone around these stars that is suitable for Earth-like temperatures would be smaller and narrower than the so-called habitable zone around our Sun. Therefore, the majority of planets would likely be colder than Earth.

In their study, the scientists tested the coldest temperature limits for two types of one-cell organisms: halophiles and methanogens. They are among a group of microbes collectively called extremophiles, so-named because they live in hot springs, acidic fields, salty lakes, and polar ice caps under conditions that would kill humans, animals, and plants. Halophiles flourish in salty water, such as the Great Salt Lake, and have DNA repair systems to protect them from extremely high radiation doses. Methanogens are capable of growth on simple compounds like hydrogen and carbon dioxide for energy and can turn their waste into methane.

The halophiles and methanogens used in the experiments are from Antarctic lakes. In the laboratory, the halophiles displayed significant growth to 30 degrees Fahrenheit (minus 1 degree Celsius). The methanogens were active to 28 degrees Fahrenheit (minus 2 degrees Celsius).

We have extended the lower temperature limits for these species by several degrees, said Shiladitya DasSarma, a professor and a leader of the team at the Center of Marine Biotechnology, University of Maryland Biotechnology Institute. We had a limited amount of time to grow the organisms in culture,

on the order of months. If we could extend the growth time, I think we could lower the temperatures at which they can survive even more. The brine culture in which they grow in the laboratory can remain in liquid form to minus 18 degrees Fahrenheit (minus 28 degrees Celsius), so the potential is there for significantly lower growth temperatures.

The scientists also were surprised to find that the halophiles and methanogens protected themselves from frigid temperatures. Some arctic bacteria show similar behavior.

These organisms are highly adaptable, and at low temperatures they formed cellular aggregates, DasSarma explained. This was a striking result, which suggests that cells may stick together when temperatures become too cold for growth, providing ways of survival as a population. This is the first detection of this phenomenon in Antarctic species of extremophiles at cold temperatures.

The scientists selected these extremophiles for the laboratory study because they are potentially relevant to life on cold, dry Mars. Halophiles could thrive in salty water underneath Mars surface, which can remain liquid at temperatures well below 32 degrees Fahrenheit (0 degrees Celsius). Methanogens could survive on a planet without oxygen, such as Mars. In fact, some scientists have proposed that methanogens produced the methane detected in Mars atmosphere.

This finding demonstrates that rigorous scientific studies on known extremophiles on Earth can provide clues to how life may survive elsewhere in the universe, DasSarma said.

The researchers next plan to map the complete genetic blueprint for each extremophile. By inventorying all of the genes, scientists will be able to determine the functions of each gene, such as pinpointing the genes that protect an organism from the cold.

Many extremophiles are evolutionary relics called Archaea, which may have been among the first homesteaders on Earth 3.5 billion years ago. These robust extremophiles may be able to survive in many places in the universe, including some of the roughly 200 worlds around stars outside our solar system that astronomers have found over the past decade. These planets are in a wide range of environments, from so-called hot Jupiters, which orbit close to their stars and where temperatures exceed 1,800 degrees Fahrenheit (1,000 degrees Celsius), to gas giants in Jupiter-like orbits, where temperatures are around minus 238 degrees Fahrenheit (minus 150 degrees Celsius).

The discovery of planets with huge temperature disparities has scientists wondering what environments could be hospitable to life. A key factor in an organisms survival is determining the upper and lower temperature limits at which it can live.

Although Martian weather conditions are extreme, the planet does share some similarities with the most extreme cold regions of Earth, such as Antarctica. Long regarded as essentially barren of life, recent investigations of Antarctic environ-

November 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 Sheila	2 Gerald	3 Ken, Jon	4 Jim O., Gerald Mt. Palomar 25
5 Ken, Larry L.	6 Gerald	7 Ken, Joyce	8 Sheila, Aubrey (C)	9 Jerry, Gerald	10 Doug, Bill	11 Jim O., Eugene
12 Jerry, Anna	13 Gerald	14 Joyce	15 Sheila, Aubrey (C) Pima CC	16 Jerry	17 Gerald	18 Jim O., Jerry Kids group 25
19 Eugene, Anna	20 Gerald Docent Meeting	21 Jerry	22 Sheila, Aubrey (C)	23 Need Docent	24 Gerald, Vance (C)	25 Jim O.
26 Jerry	27 Gerald	28 Need Docent	29 Sheila, Aubrey (C)	30 Jerry, Eugene		

MICROBES, CONTINUED FROM PAGE 2

ments have revealed considerable microbial activity. The Archaea and bacteria that have adapted to these extreme conditions are some of the best candidates for terrestrial analogues of potential extraterrestrial life; understanding their adaptive strategy, and its limitations, will provide deeper insight into fundamental constraints on the range of hospitable environments, DasSarma said.

The teams research was supported through grants from the Space Telescope Science Institutes Directors Discretionary Research Fund, a National Science Foundation, and the Australian Research Council.

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One of five centers forming the University of Maryland Biotechnology Institute (UMBI) the center of Marine Bio-

technology, located in Baltimore's Inner Harbor, employs researchers who apply the tools of modern biology and biotechnology to study, protect, and enhance marine and estuarine resources.

For images and additional information about these microbes on the Web, visit <http://hubblesite.org/news/2006/48>

Contacts
Neill Reid
Space Telescope Science Institute, Baltimore, Md.
Phone: 410-338-4971, E-mail: inr@stsci.edu

Shiladitya DasSarma
University of Maryland Biotechnology Institute
Baltimore, Md.

Phone: 410-234-8847; E-mail: dassarma@umbi.umd.edu